CLAIMS

1. A humanized anti-TAG-72 CC49 monoclonal antibody comprising:

a light chain comprising a light chain Complementarity Determining Region (L-CDR)1, a L-CDR2, a L-CDR3, and a light chain framework region from HuCC49V10, a heavy chain comprising a heavy chain Complementarity Determining Region (H-CDR)1, a H-CDR2, a H-CDR3, and a heavy chain framework region from HuCC49V10, wherein the light chain framework region comprises a corresponding framework residue from human antibody LEN at position 5, 19, 21, and 106 in the light chain, and wherein the heavy chain framework region comprises a corresponding framework residue from human antibody 21/28'CL at positions 20, 38, 48, 66, 67, 69, and 80 in the heavy chain;

wherein the humanized CC49 antibody retains binding affinity for TAG-72 and has reduced immunogenicity, as compared to a parental humanized CC49 V10 antibody.

2. The monoclonal antibody of claim 1, further comprising a corresponding human LEN framework residue at position 43 in the light chain.

3. The monoclonal antibody of claim 1, further comprising a corresponding human LEN framework residue at position 78 in the light chain.

4. The monoclonal antibody of claim 1, further comprising a corresponding LEN human framework residue at position 100 in the light chain.

5. The monoclonal antibody of claim 1, further comprising a corresponding human 21/28'CL framework residue at position 12 in the heavy chain.

6. The monoclonal antibody of claim 1, further comprising a corresponding human 21/28'CL framework residue at position 40 in the heavy chain.

7. The monoclonal antibody of claim 1, wherein the light chain framework region further comprises a corresponding human LEN framework residue at position 43, 78, and 100 in the light chain and a corresponding human 21/28'CL framework residue at position 12 in the heavy chain.

8. The monoclonal antibody of claim 1, wherein L-CDR1 comprises an amino acid sequence set forth as SEQ ID NO: 9, L-CDR2 comprises an amino acid sequence set forth as SEQ ID NO: 10, and L-CDR3 comprises an amino acid sequence set forth as SEQ ID NO: 11.

9. The monoclonal antibody of claim 1, wherein H-CDR1 comprises an amino acid sequence et forth s SEQ ID NO: 12, H-CDR2 comprises an amino acid sequence set forth as SEQ ID NO: 13, and H-CDR3 comprises an amino acid sequence set forth as SEQ ID NO: 14.

10. The monoclonal antibody of claim 1, wherein the light chain framework comprises SEQ ID NO: 1 and wherein the residue at position 5 in the light chain is a threonine, the residue at position 19 in the light chain is an alanine, and the residue at position 21 in the light chain is an isoleucine.

11. The monoclonal antibody of claim 1, wherein the light chain framework comprises an amino acid sequence set forth as SEQ ID NO: 2 and wherein the residue at position 43 in the light chain is a proline.

12. The monoclonal antibody of claim 1, wherein the light chain framework comprises an amino acid sequence set forth as SEQ ID NO: 3 and wherein the residue at position 78 in the light chain is a leucine.

13. The monoclonal antibody of claim 1, wherein the light chain framework comprises an amino acid sequence set forth as SEQ ID NO: 4 and wherein the residue at position 100 in the light chain is a glutamine and the residue at position 106 in the light chain is an isoleucine.

14. The monoclonal antibody of claim 1, wherein the heavy chain framework comprises an amino acid sequence set forth as SEQ ID NO: 5 and wherein residue at position 20 in the heavy chain is a valine.

15. The monoclonal antibody of claim 14, wherein the heavy chain framework comprises an amino acid sequence set forth as SEQ ID NO: 5 and wherein residue at position 12 in the heavy chain is a lysine.

16. The monoclonal antibody of claim 1, wherein the heavy chain framework comprises an amino acid sequence set forth as SEQ ID NO: 6 and wherein the residue at position 38 in the heavy chain is an arginine and the residue at position 48 in the heavy chain is a methionine.

17. The monoclonal antibody of claim 16, wherein the heavy chain framework comprises an amino acid sequence set forth as SEQ ID NO: 6 and wherein the residue at position 40 in the heavy chain is an alanine.

18. The monoclonal antibody of claim 1, wherein the heavy chain framework comprises an amino acid sequence set forth as SEQ ID NO: 7 and wherein the residue at position 66 in the heavy chain is an arginine, the residue at position 67 in the heavy chain is an isoleucine, and the residue at position 80 in the heavy chain is a methionine.

19. The monoclonal antibody of claim 1, wherein the heavy chain framework comprises the amino acid sequence set forth as SEQ ID NO: 8.

20. The monoclonal antibody of claim 1, further comprising a detectable label.

21. The monoclonal antibody of claim 1, further comprising an effector molecule.

22. The monoclonal antibody of claim 20, wherein the label is a fluorescent or a radioactive molecule.

23. The monoclonal antibody of claim 21, wherein the effector molecule is a toxin.

24. A composition comprising a functional fragment of the humanized monoclonal antibody of claim 1, wherein the functional fragment specifically binds TAG-72.

25. The composition of claim 24, wherein the fragment comprises an Fv, an Fab, or an $F(ab')_2$.

26. The composition of claim 25, wherein the antibody is encoded by a nucleic acid sequence as deposited as ATCC PTA-5415.

27. A pharmaceutical composition comprising a therapeutically effective amount of the antibody of claim 1 in a pharmaceutically acceptable carrier.

28. A method for treating a subject with a tumor that expresses TAG-72, comprising: administering a therapeutically effective amount of the humanized antibody of claim 1 to the subject, thereby treating the tumor.

29. The method of claim 28, wherein the humanized antibody is encoded by a nucleic acid sequence as deposited as ATCC PTA-5415.

30. A method for detecting a cell expressing TAG-72 in a subject, comprising

contacting a sample from the subject with the antibody of claim 1, and

detecting the presence of a complex of the antibody with TAG-72,

thereby detecting a cell expressing TAG-72.

31. The method of claim 30, wherein the subject has a tumor.

32. The method of claim 31, wherein the antibody is labeled.

33. The method of claim 30, wherein the antibody is encoded by a nucleic acid deposited as ATCC PTA-5415.

34. The method of claim 30, wherein the sample is a biopsy specimen, autopsy specimen, and pathology specimens, or a biological fluid.

35. A method for *in vivo* diagnosis of cancer in a subject, comprising

(a) administering to an mammal a diagnostically effective amount of the antibody of claim 20,

(b) allowing sufficient time for the antibody to become specifically localized to at least one cancer cell, and

(c) detecting the labeled antibody in vivo at a site where the antibody has become localized, thereby diagnosing the cancer.

36. A kit comprising

a container comprising the humanized antibody of claim 1 and

instructions.

37. A monoclonal antibody, comprising a heavy and a light chain variable region, wherein

the light chain variable region comprises a light chain framework region comprising amino acid sequences set forth as SEQ ID NOs: 41-44, and light chain complementarity determining regions comprising amino acid sequences set forth as SEQ NOs: 9-12;

the heavy chain variable region comprises a heavy chain framework region comprising amino acid sequences set forth as SEQ ID NOs: 49-52, and heavy chain

complementarity determining regions comprising amino acid sequences set forth as SEQ ID NOs: 12-14; and

wherein the humanized CC49 antibody retains binding affinity for TAG-72 and has reduced immunogenicity, as compared to a parental humanized CC49 V10 antibody.

38. An isolated nucleic acid encoding the antibody of claim 1.

39. A vector comprising a promoter operably linked to the nucleic acid of claim 38.

40. A host cell transformed with the vector of claim 39.

41. The host cell of claim 40, wherein the cell is a eukaryotic cell.

42. The antibody of claim 1, further comprising a tyrosine to proline substitution in L-CDR3 at position 91.

43. The antibody of claim 42, further comprising a valine to leucine substitution at position 27b.